



Simulations of Edge and Scrape Off Layer turbulence in MAST plasmas

Militello, F.; Fundamenski, W.; Naulin, Volker; Nielsen, Anders Henry

Publication date:
2012

[Link back to DTU Orbit](#)

Citation (APA):

Militello, F., Fundamenski, W., Naulin, V., & Nielsen, A. H. (2012). *Simulations of Edge and Scrape Off Layer turbulence in MAST plasmas*. Abstract from 20th International Conference on Plasma Surface Interactions, Aachen, Germany.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Simulations of Edge and Scrape Off Layer turbulence in MAST plasmas

F.Militello¹, W. Fundamenski¹, V. Naulin², A. Nielsen²

¹*EURATOM/CCFE Fusion Association, Culham Science Centre, Abingdon, Oxon, OX14 3DB, UK*

²*Association EURATOM-Risø National Laboratory, OPL-128 Risø, DK-4000 Roskilde, Denmark*

The L-mode interchange turbulence in the edge and Scrape Off Layer of MAST is investigated numerically. The tight aspect ratio of MAST (which increases the interchange drive) and its magnetic geometry (which produces large values of the safety factor at the edge) put this machine in a peculiar plasma regime for the edge turbulence.

The dynamics of the boundary plasma is investigated using the 2D fluid code ESEL [1], which has previously shown good interpretative capabilities for large aspect ratio machines [2,3]. Scans on various engineering parameters, such as magnetic field, plasma current, input power (i.e. edge temperature) and fuelling (i.e. edge density), are performed with the aim of characterising the profiles, fluctuation level and statistics of the edge/SOL density and temperature. The goal of this particular approach, which was not previously attempted with this code, is not to match a particular experimental result but to provide an broad overview of the turbulent dynamics in an experimentally relevant parameter space.

In addition to these scans, we also discuss how the system changes when the length of the divertor leg is modified. This allows to identify the regime of operation of the Super-X divertor which will be implemented on MAST-Upgrade.

The analysis of the results will focus on both equilibrium (average profile) features and fluctuation statistics. In this context, particular attention will be devoted to the scaling of the temperature and density e-folding lengths with engineering parameters with the aim of determining the particle and energy width of the Scrape Off Layer in different experimental conditions. In addition, the variation of relevant statistical quantities, such as the skewness and flatness of the PDF and amplitude of the turbulence, will be discussed. Finally, the results obtained will be related to drift-fluid dimensionless parameters [4] in order to find universal trends.

[1] O. E. Garcia, V. Naulin, A. H. Nielsen, and J. Juul Rasmussen, Phys. Rev. Lett. 92, 165003 (2004)

[2] O. E. Garcia, J. Horacek, R.A. Pitts et al, Plasma Phys. Control. Fusion 48, L1 (2006)

[3] W. Fundamenski, O.E. Garcia, V. Naulin et al., Nucl. Fusion 47, 417 (2007)

[4] F. Militello, W. Fundamenski, Plasma Phys. Control. Fusion 53, 095002 (2011)

This work was funded by the United Kingdom Engineering and Physical Sciences Research Council under grant EP/G003955 and the European Communities under the contract of Association between EURATOM and CCFE. The views and opinions expressed herein do not necessarily reflect those of the European Commission.